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(54) Apparatus for placing road marker cones

(57) An apparatus for placing marker cones on a carriage-way comprises a vehicle movable along the carriage-way and a conveyor (2) secured to the vehicle and extending in a direction generally opposite to the direction of vehicle movement. The cones (12) are sequentially loaded onto the conveyor from the vehicle and travel to a discharge end (8) at which cones are discharged from the conveyor onto the carriage-way. The conveyor (2) is driven at such a speed that cones (12) are positively moved along the conveyor from a loading end (7) to the discharge end (8) and, at the moment of discharge, have a velocity relative to the carriage-way which is less than the velocity of the vehicle relative to the carriage-way. Preferably the relative velocity is nil.

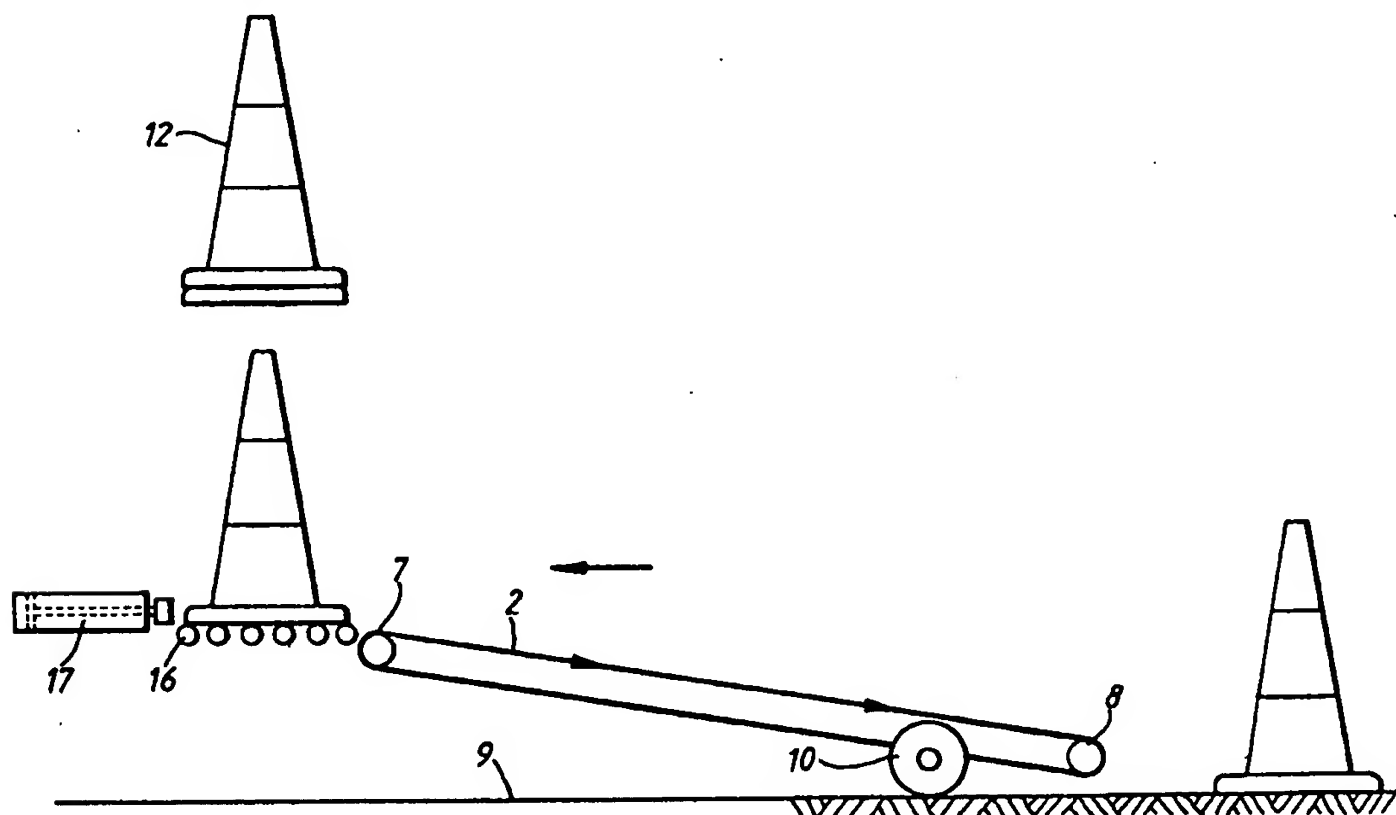
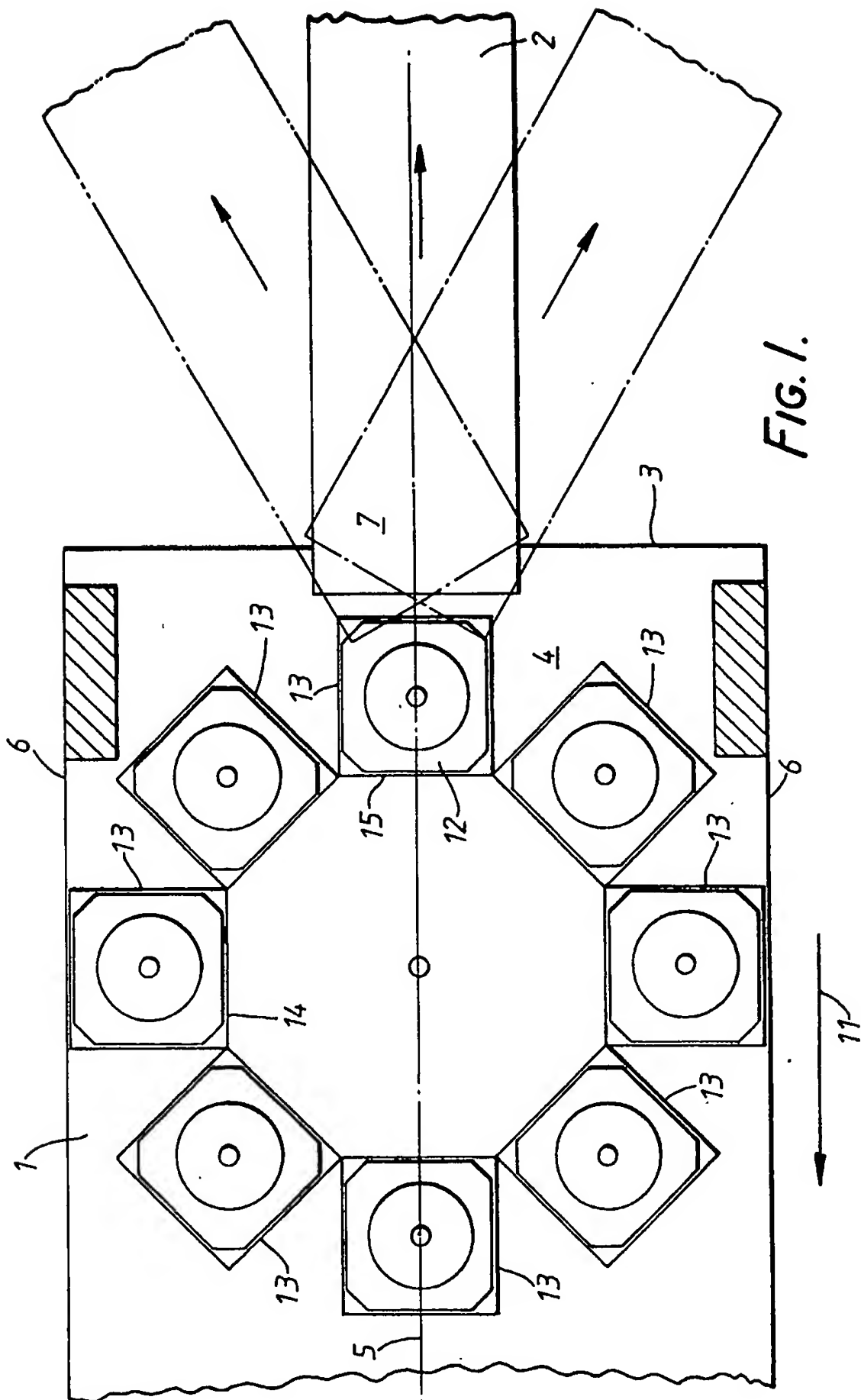


FIG. 2.

The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.  
The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1982.

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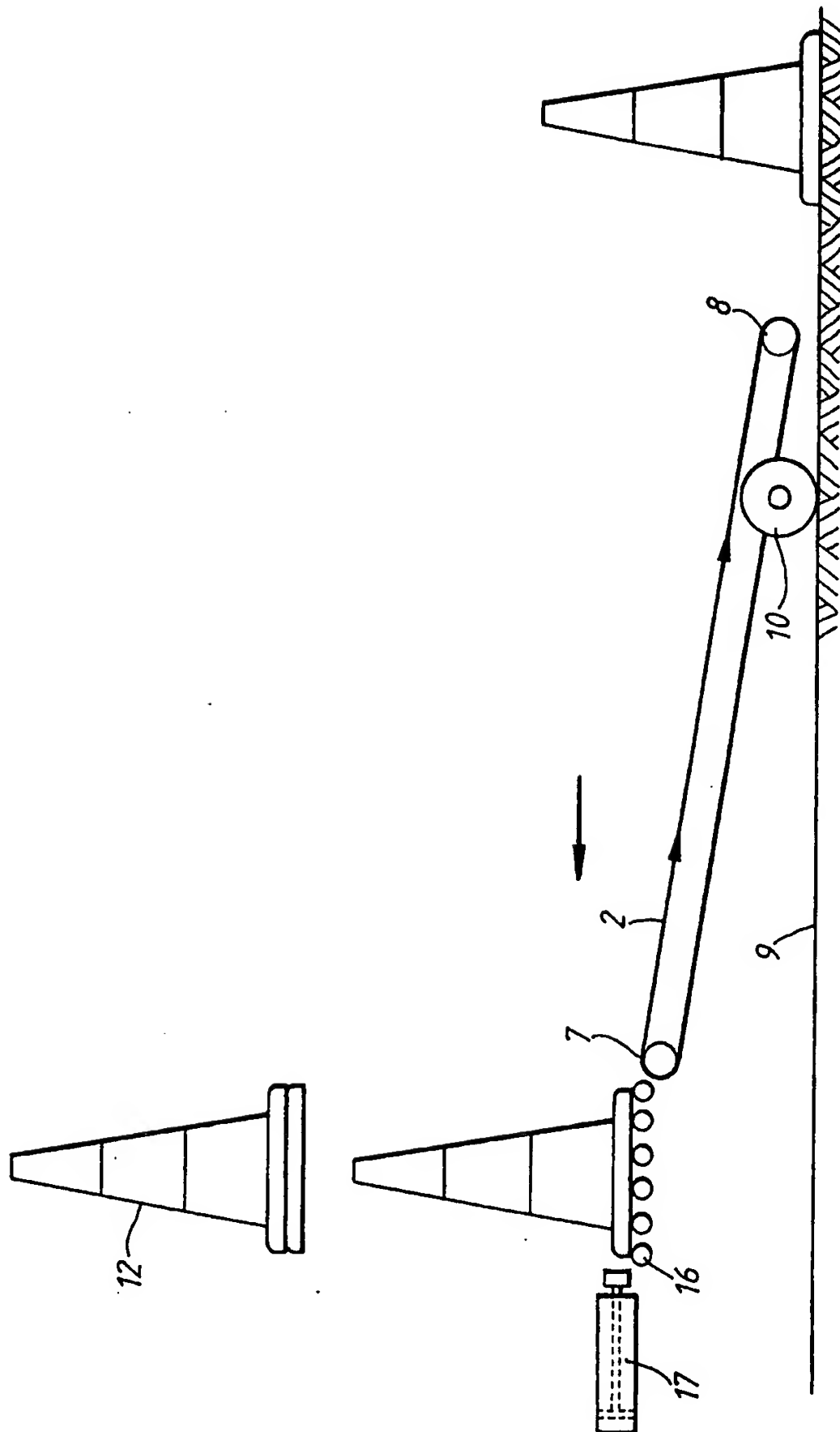


FIG. 2.

## SPECIFICATION

### Apparatus for placing marker cones

5 This invention relates to apparatus for placing marker cones on a carriage-way, e.g. the carriage-way of a motorway.

It is often necessary to place a series of marker cones on the carriage-way of a trunk road or motorway in order to divert traffic from entering a particular lane of the road or motorway. Previously, such cones have been laid by hand from a lorry or trailer. This procedure is, however, unsatisfactory for a number of reasons. For example, the speed at which cones can be placed is limited by the ability of the persons placing the cones to lift and place the relatively large and heavy cones on the carriage-way. Further, if an attempt is made to lay the cones from a moving vehicle the speed at which the cones can be laid is limited not only by the speed at which those laying the cones can work, but also by the fact that the cones are, at the moment of impact with the carriage-way, moving relative to the carriage-way at the speed of the vehicle. This limits the accuracy with which the cones can be placed, and if the speed of the vehicle is too great it is liable to result in toppling over of the cones. Further, a motorway in particular is a hazardous environment in which to work, and the presence of persons manually positioning cones is highly undesirable. Finally, without means for controlling the spacing of the cones, manually positioned cones are liable to be at irregular spacings which is undesirable in that if the cones are too far apart they do not provide an effective barrier, and if the cones are too close together an excessive number of cones is required to cone off a particular length of carriage-way.

According to one aspect of the present invention there is provided apparatus for placing marker cones on a carriage-way, the apparatus comprising: a vehicle movable along the carriage-way; a conveyor secured to the vehicle and extending in a direction generally opposite to the direction of vehicle movement from a loading end at which cones are sequentially loaded onto the conveyor to a discharge end at which cones are discharged from the conveyor onto the carriage-way; and means for driving the conveyor whereby cones are positively moved along the conveyor from the loading end to the discharge end and, at the moment of discharge, have a velocity relative to the carriage-way which is less than the velocity of the vehicle relative to the carriage-way.

The term "cone" as used herein is intended to mean an upstanding marking device for temporary use on a carriage-way, and is not to be construed as limited to marking devices of conical shape.

The vehicle may be a self propelled vehicle or may be a trailer to be towed, for example by a police vehicle. In one embodiment of the invention the conveyor loading end is located centrally at the rear of a working platform of the vehicle, and the conveyor is locatable in any of a range of angular positions relative to the axis of the vehicle whereby the line of cones placed by the vehicle may be located at the off-side edge of the vehicle at the near-side edge of the vehicle, or at any position therebetween. Thus, the conveyor may extend obliquely to the axis of the vehicle and the term "in a direction generally opposite to the direction of vehicle travel" should be construed accordingly.

The speed at which the conveyor is driven may correspond exactly to the road speed of the vehicle, whereby the cones have no forward or backward velocity relative to the carriage-way at the moment of discharge from the conveyor. However, particular circumstances may be such that the conveyor is desirably driven at a slower or greater speed than the road speed of the vehicle, leading to some forward or rearward velocity of the cones relative to the carriage-way at the moment of discharge. Such slower or faster driving of the conveyor may be particularly desirable when the conveyor is located with its longitudinal axis oblique to the direction of movement of the vehicle.

The conveyor may be supported on carriage-way engaging wheels which may be used to drive the conveyor at a speed directly proportional to the speed of rotation of the wheels. In this manner, the speed of the conveyor will automatically vary with vehicle speed. In the alternative, sensor means may be provided on the vehicle or on the conveyor to detect the forward speed of the vehicle and conveyor, and signals from the sensor means may be used to control a powder drive to the conveyor in order to effect the required control of conveyor speed.

Loading of cones onto the conveyor may be effected manually, but is preferably effected automatically from a supply of cones carried on the vehicle. The cones may, for example, be mounted in magazines and automatically released onto the conveyor at time intervals determined by the speed of the vehicle, in order to ensure that the cones are located at precisely required spacings on the carriage-way. The magazines can, for example, be mounted on a carousel arrangement whereby when one magazine is emptied it is automatically replaced by a full magazine by rotation of the carousel. With such an arrangement, cones may automatically be positioned on the carriage-way by a vehicle travelling at a significant speed, e.g. 20 mph.

The invention will be better understood from the following description of a preferred embodiment thereof, given by way of example

only, reference being had to the accompanying drawing which illustrates schematically certain features of the invention, and in which:

*Figure 1* is a schematic plan view of a vehicle; and

*Figure 2* illustrates schematically operation of the vehicle of Fig. 1.

Referring firstly to Fig. 1 there is shown the rear of a vehicle 1 which may be in the form of a trailer, or a lorry. A conveyor 2 is secured to the vehicle 1 at the centre of the rear edge 3 of a working platform 4 of the vehicle. The conveyor 2 may be located in a range of angular positions relative to the longitudinal axis 5 of the vehicle, and in particular may be positioned at any angular position between the extreme positions illustrated in broken lines on Fig. 1. In the respective stream positions of the conveyor the discharge end of the conveyor (not shown in Fig. 1) is located aligned with or extending slightly beyond the side edges 6 of the vehicle. Thus, in the extreme positions of the conveyor cones may be discharged from the vehicle at the off-side or the near-side of the vehicle.

The conveyor 2 may be of any suitable type, for example a belt conveyor, and extends from a loading end 7 located at the rear of the vehicle 1, and a discharge end 8 located adjacent the carriage-way surface 9. The rear of the conveyor is preferably supported on wheels 10. The upper surface of the conveyor is driven to move items located on the upper surface away from the rear edge 3 of the vehicle, i.e. the upper surface of the conveyor is driven in the direction opposite to the direction of vehicle movement indicated by the arrow 11 of Fig. 1. The speed at which the conveyor is driven is related to vehicle speed and is in the range of from slightly less than to slightly more than vehicle speed. The conveyor may be driven by means of suitable gearing from the support wheels 10, or may be driven by a separate power source which is controlled in response to a sensor for detecting vehicle speed.

Cones 12 to be positioned on the carriage-way are mounted in magazines 13 which themselves form or are secured to a carousel arrangement 14 rotatable about a vertical axis on the working platform 4 to locate each magazine in turn in a working position 15. In the working position, the cones 12 are vertically above a set of rollers 16 located adjacent the loading end 7 of the conveyor. The cones are dropped one at a time from the magazine 13 onto the rollers 16, and are ejected from the rollers onto the conveyor 2 by an ejection cylinder 17. The release of cones from the magazines and operation of the ejection cylinder is preferably under automatic control in response to a sensor for detecting speed of movement of the vehicle. In this manner, cones may be ejected onto the conveyor 2 at time intervals such that the

cones will be placed on the carriage-way at a selected spacing. Similarly, movement of the carousel is preferably under automatic control.

When a cone is ejected onto the conveyor 2 it travels down the conveyor at little or no velocity relative to the underlying carriage-way, and accordingly when it moves from the discharge end of the conveyor 8 onto the carriage-way there is little or no tendency for the cone to jump out of position or fall over.

Whilst positioning of cones on the conveyor is preferably automated e.g. as described above, it will be appreciated that cones may manually be loaded on the conveyor if desired.

The provision of a conveyor driven in a direction opposite to the direction of vehicle movement enables the vehicle to move at substantial speed during cone laying operations. This factor, combined with the inherent speed and accuracy of automatic positioning of cones on the conveyor enables cones to be laid rapidly and precisely.

## 90 CLAIMS

1. An apparatus for placing marker cones on a carriage-way, the apparatus comprising: a vehicle movable along the carriage-way; a conveyor secured to the vehicle and extending in a direction generally opposite to the direction of vehicle movement from a loading end at which cones are sequentially loaded onto the conveyor to a discharge end at which cones are discharged from the conveyor onto the carriage-way; and means for driving the conveyor whereby cones are positively moved along the conveyor from the loading end to the discharge end and, at the moment of discharge, have a velocity relative to the carriage-way which is less than the velocity of the vehicle relative to the carriage-way.

2. An apparatus as claimed in claim 1, wherein the conveyor loading end is located centrally at the rear of a working platform of the vehicle, and the conveyor is locatable in any of a range of angular positions relative to the axis of the vehicle whereby the line of cones placed by the vehicle may be located at the off-side edge of the vehicle, at the near-side edge of the vehicle, or at any position therebetween.

3. An apparatus as claimed in either claim 1 or claim 2, wherein the rearward component of the speed at which the conveyor is driven corresponds exactly to the road speed of the vehicle, whereby the cones have no forward or backward velocity relative to the carriage-way at the moment of discharge the conveyor.

4. An apparatus as claimed in claim 3, wherein the conveyor is supported on carriage-way engaging wheels which are used to drive the conveyor at a speed directly proportional to the speed of rotation of the wheels.

5. An apparatus as claimed in claim 3,

wherein sensor means are provided on the vehicle or on the conveyor to detect the forward speed of the vehicle and conveyor, and signals from the sensor means control a

5 power drive to the conveyor in order to effect the required control of conveyor speed.

6. An apparatus as claimed in any one of the preceding claims, wherein loading of cones onto the conveyor is effected automatically from a supply of cones carried on the vehicle, mounted in magazines and automatically released onto the conveyor at time intervals determined by the speed of the vehicle, in order to ensure that the cones are located  
10 at precisely required spacings on the carriage-way.

7. An apparatus as claimed in claim 6, wherein the magazines are mounted on a carousel arrangement whereby when one magazine is emptied it is automatically replaced by a full magazine by rotation of the carousel.  
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8. An apparatus for placing marker cones on a carriage-way, substantially as described herein with reference to the accompanying  
25 drawings.

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